

No. 16,481

IN THE

**United States Court of Appeals
For the Ninth Circuit**

EVIS MANUFACTURING COMPANY, a corporation,
ARTHUR N. WELLS,

Petitioners,

vs.

FEDERAL TRADE COMMISSION,

Respondent.

PETITIONERS' REPLY BRIEF

FRANCIS R. KIRKHAM,

JAMES MICHAEL,

HARRY C. SCOTT,

PILLSBURY, MADISON & SUTRO,

225 Bush Street, San Francisco 4, California,

Attorneys for Petitioners.

FILED

JUL 2 1964

FRANK H. BOWEN, C.

Table of Contents

	Page
A. The “‘blow-down’ tale” and the ion exchange test (Resp. Br. 51, 49)	6
B. The Evis “pipe” (Resp.Br. 5)	10
C. The purported conflict in the consumer testimony	11
D. Drs. Albrook and Adams (Resp.Br. 48-49)	15
E. Dr. Weast’s tests (Resp.Br. 44)	18
F. Dr. Hoffman (Resp.Br. 12-13)	19
G. Petitioners’ witnesses O’Connell and Frantz (Resp.Br. 10, 25-26, 39-40)	23
H. Petitioners’ instructions (Resp.Br. 32-39)	25
I. The Commission’s suggestion that the discontinuance of chemicals or changes in water supply “could have caused” the benefits which resulted from the installation of the Evis units	27
Conclusion	31
Appendix	

Table of Authorities Cited

	Pages
Business Week, March 26, 1960, pp. 86, 93, 96.....	6
Deadrich v. United States, 74 F.2d 619.....	3
DeForest Radio Co. v. Gen. Elec. Co., 283 U.S. 664.....	24
De Forest’s Training v. Federal Trade Commission, 134 F.2d 819	32
Diamond Rubber Co. v. Consol. Tire Co., 220 U.S. 428.....	23, 24
Differential Steel Car Co. v. MacDonald, 180 F.2d 260....	3
Galloway v. United States, 130 F.2d 467.....	3
Navajo Freight Lines v. Mahaffy, 174 F.2d 305.....	2
State of Washington v. United States, 214 F.2d 33.....	3
United States v. Thornburgh, 111 F.2d 278.....	3

No. 16,481

IN THE

**United States Court of Appeals
For the Ninth Circuit**

EVIS MANUFACTURING COMPANY, a corporation,
ARTHUR N. WELLS,

Petitioners,

vs.

FEDERAL TRADE COMMISSION,

Respondent.

PETITIONERS' REPLY BRIEF

Most respectfully we submit that the Commission's brief, like the Commission's decision, establishes more effectively than anything else possibly could the lack of merit in the Commission's case.

In our opening brief we reviewed the evidence, both that submitted by petitioners and that presented by the Commission, and showed the total lack of support for the Commission's decision. The Commission's brief fails to discredit that showing in any way. For reasons which hereinafter we point out, it only emphasizes the prejudiced and capricious nature of its order.

Basically the Commission argues, (1) the mere "opinions" of the scientists that the Evis unit cannot benefi-

cially affect water, regardless of whether or not these scientists ever performed any tests (Resp. Br. 27-32), are substantial evidence that it does not beneficially affect water (Resp. Br. 11-14); (2) the tests performed by the scientists are substantial evidence that the Evis unit does not beneficially affect water (Resp. Br. 14-24); (3) the "conflicting consumer testimony" is not sufficient to overcome this "substantial" scientific testimony and, in any event, if there is conflict it is for the Commission and not for the court to weigh the evidence (Resp. Br. 24-32).

These contentions are untenable. There is no conflicting consumer testimony in this case (see pp. 11-15, *infra*). The evidence establishes as an indisputable physical fact that the Evis unit *does* beneficially affect water (Pet.Op.Br. 5-25). An expert opinion that a phenomenon which in fact occurs cannot occur is not substantial evidence. Similarly, testimony that a laboratory test on a few liters of water shows no change in molecular structure or in dielectric constant or in conductivity or in surface tension, etc., etc., is not substantial evidence that beneficial effects cannot occur in industrial and other practical installations when in fact beneficial effects in such installations *do* occur.¹

¹In addition, as Mr. O'Connell testified (R. IV, 2992):

"The concentrations of the material we are dealing with are so small, and in the case of treatment of surface waters so relatively variable that it is almost impossible to duplicate in a laboratory field conditions."

Also, as the court pointed out in *Navajo Freight Lines v. Mahaffy* (10 Cir. 1949) 174 F.2d 305, 310,

"The party offering evidence of out-of-court experiments must lay a proper foundation by showing a similarity of circumstances and conditions. * * *

* * * Evidence of this kind should be received with caution * * *. In many instances, a slight change in the condi-

This court repeatedly has stated and applied the “well-settled rule”² that:

“Opinion evidence in conflict with the physical facts * * * is not substantial evidence * * * .

* * * * *

Where physical facts contradict expert opinions, the facts must govern. Testimony of an expert can not prevail over such physical facts; and neither court nor jury is permitted to credit testimony so contradicted. * * *

Evidence contradicted by the physical facts is entitled to no credence” (*State of Washington v. United States* (9 Cir. 1954) 214 F.2d 33, 43).

As this court said in *Deadrich v. United States* (9 Cir. 1935) 74 F.2d 619, a case involving a claim of total and permanent disability (p. 622):

“How can it be said that he could not work, when in fact he did work?”

Under these decisions no substantial evidence in support of the Commission’s position can be found in the fact that witness de Bussieres “stated that according to his knowledge of theoretical chemistry, there is not ‘* * * anything about the device that would cause a change in the charac-

tions under which the experiment is made will so distort the result as to wholly destroy its value as evidence, and make it harmful, rather than helpful.’”

²*Deadrich v. United States* (9 Cir. 1935) 74 F.2d 619, 622.

And see:

Differential Steel Car Co. v. MacDonald (6 Cir. 1950) 180 F.2d 260, 268;

Galloway v. United States (9 Cir. 1942) 130 F.2d 467, 471;

United States v. Thornburgh (8 Cir. 1940) 111 F.2d 278, 280.

teristic of water passing through it' ” (Resp.Br. 11); that Dr. Hoffman could not “visualize any ‘* * * scientific basis upon which [petitioners’] claims are based * * *’ ” (Resp.Br. 12); that witness Gildea “expressed the view that problems of water treatment are primarily of a chemical nature and that a device such as the Evis pipe could have no effect on water without changing ‘* * * the chemistry of it’ ” (Resp.Br. 13).

The Commission’s whole attitude is summed up at page 50 of its brief:

“Yet no one can be so credulous as to believe that a scientific invention cannot be proved by scientific tests.”

This arbitrary position is not only rebutted by numerous occurrences within our common knowledge (see, e.g., Pet. Op.Br., 49 f.n. 47, and f.n. 3, *infra*) but is discredited by the testimony in this very record. To take but one example, the threshold treatment of water simply cannot be scientifically explained; indeed, it operates directly contrary to all known laws of chemistry. And this is established not only by petitioners’ witness but by the Commission’s own witness (Pet.Op.Br. 53-54). As Mr. O’Connell pointed out (Pet.Op.Br. 47-56), many treatments of water, including those involving the mere introduction of metal into the water system, have been greeted with skepticism and have been appraised as “scientifically impossible” under the knowledge of the day. Yet these treatments *worked* and, since the Commission did not enjoin their use, still work. Indeed, as we pointed out in our opening brief (p. 49), the amazing “sacrificial anode” now is used to protect metal from the corrosive effects of

water from the family water heater to the locks of the Panama Canal.³

The foregoing, we submit, answers the Commission's basic contentions. We wish also, however, to correct numerous inaccuracies and misrepresentations which appear in the Commission's brief. Some of these, as we shall point out, reflect such an incredible misunderstanding of the testimony as to give emphasis to the legal principle that accords due weight to the decision of the Hearing Examiner. In this case, as we have seen, he "lived" for

³Recent achievements in the electronics field are now common knowledge, yet were considered impossible only a few years ago. A current article traces the development, by empirical methods, of processes to alter the crystalline structure of certain metals whereby they acquired new and wholly unknown characteristics, permitting their use as semiconductors or transistors:

"* * * early in 1940 * * * a staff member working with silicon metal * * * demonstrated an unusual photoelectric cell made from pure silicon.

Until that time, photocells had operated on the electrical effect produced by the interaction of the surfaces of two different metals exposed to light. Ohl's cell, by contrast, generated current in a single piece of metal—and the current was about ten times stronger than usual.

* * * * *

The point contact transistor was a partial answer to the need for a better switch. The device looked simple; it had no parts to wear or burn out, and it was incredibly small. * * *

* * * Bell Labs' physicists didn't really understand why a point contact transistor worked. * * *

* * * * *

* * * The next advance required * * * research—into the properties of crystalline semiconductors * * *

* * * * *

* * * Shockley proposed a method of controlling current flow between areas of impurity elements in the crystal itself. These impurities would be introduced into the single crystal in amounts so tiny that ordinary chemical or metallurgical analysis couldn't detect them. * * *

* * * * *

In 1954 * * * a metallurgist, invented zone refining. This is a high-frequency heating technique that can melt a local-

nearly four years with the case, heard the witnesses and understood their testimony. We start with two outstanding instances of misrepresentation quite obviously due to lack of understanding:

A. The “ ‘blow-down’ tale” and the ion exchange test (Resp. Br. 51, 49).

In our opening brief we described Dr. Johnson’s experiment “for the prevention and removal of scale” (Pet.Op. Br. 66-70). Purporting to answer our statement the Commission says (Resp.Br. 51):

ized area of a long ingot of germanium—or other metal—and sweep the melted zone through the length of the ingot. The melted material is either a more or less effective solvent for impurities than the solid; so it sweeps the impurities in the metal to one end or the other of the crystal.

This technique was a boon: It not only purified the germanium, but it also concentrated the impurities in one end where more of them could be identified. It also provided a way to spread impurities evenly, under close controls, through the crystal.

* * * * *

In 1955, there were two principal techniques for producing this transistor sandwich.

The simplest—and still most common—method is to allow dots of impurity elements on opposite sides of a thin slice of germanium or silicon. * * *

The other way is to grow a junction in a single crystal. By adding impurities to the melt as the crystal is slowly withdrawn, impurity layers are placed across the diameter of the crystal. * * *

* * * * *

The next stride came in 1955, when Bell Labs came up with the diffusion method. It produced an impurity layer on wafers of single crystal germanium or silicon by heating the material in an atmosphere containing gaseous impurities. This diffused the impurities into the surface. Before it was possible to use this method, though, Bell’s scientists had to identify—and control—other impurities that interfered with the material’s talents as semiconductors when heated to diffusion temperatures. Those impurities were deadly in such small amounts that no method of analysis could detect them” (Business Week, March 26, 1960, pp. 86, 93, 96).

“Now, as for the ‘blow-down’ tale, * * * at least three of the user witnesses who testified regarding the success of Evis stated that they did not clean their evaporator condensers after the installation of the Evis pipe (III, 1984; IV, 2569-2570, 2648).”

This statement is literally meaningless. The three “user witnesses” to whose testimony the Commission refers are Suchodolski (R. III, 1984), Buchanan (R. IV, 2569) and Morris (R. IV, 2648). Suchodolski testified concerning three evaporative (not evaporator) condensers which cool refrigerant gas by spraying cold water in the open air over pipes carrying the gas to condensers (R. IV, 2280), as contrasted with Dr. Johnson’s stills in which water is boiled away. He testified that he no longer had to clean the tubes, vats and nozzles of the evaporative condensers, because, since the installation of the Evis unit, hard scale no longer formed (R. III, 1984-1985).

Buchanan testified concerning shell and tube type condensers where cold water flows through coils to cool refrigerant gas flowing through a shell or chamber on its way to the condenser (R. IV, 2280). He too testified that after installation of the Evis there was nothing to clean in the tubes and condensers because the scale which had previously caused so much trouble no longer formed (R. III, 2566-2571).

Morris, on the other hand, was a marine engineer who operated an evaporator in which water is boiled to produce steam to be condensed into boiler water. This operation *does* resemble Dr. Johnson’s stills and the record is quite clear that Mr. Morris blew down his evaporator,

before the Evis was installed every three hours, after the Evis was installed every eight hours (R. IV, 2646):

“We shut off the steam supply, secured the evaporator, filled the evaporator up with water, opened up the steam supply, raised the pressure inside the shell, opened up the skin valve, the blow down valve on the evaporator. The pressure blew the water out over the side, removing sludge and so forth.”

With regard to cleaning, Morris stated:

“Q After the installation of the Evis, was scale in the evaporator more easily removed than before?

A As far as I was concerned there wasn't any scale to remove” (R. IV, 2647) “* * * Well, after installing the Evis it wasn't necessary to descale it at all” (R. IV, 2649).

Further, the Commission seeks to excuse Dr. Johnson's incredible experiments with water containing up to 1797.6 parts silica per million, when petitioners had specifically represented that the unit was not effective in the treatment of water containing more than 60 parts per million, (1) by characterizing this representation as an “instruction” which was not included in the instructions available to Dr. Johnson and therefore not followed by him (Resp.Br. 50), and (2) because the Evis bulletin containing the statement that the unit was not effective in water containing more than 60 parts per million of silica “was published *once* [Commission's italics], i.e., in 1953.” The Commission goes on to say (Resp.Br. 51):

“Yet, petitioners have the audacity to claim that these tests were not carried out according to instructions * * *.”

This comment, again, can only be excused on the assumption of complete lack of understanding. The statement in the Evis bulletin was no part of any instruction. It was a representation as to the type of water in which the Evis is effective. Dr. Johnson was the Commission's expert witness and performed his tests under instructions supplied by the Commission (RX 59, R. VI, 1162, 2-11/6168-1, pp. 61-63). The bulletin containing the statement concerning silica was in the hands of the Commission on September 15, 1953, and was introduced in evidence in these proceedings on May 20, 1954, more than three years before Dr. Johnson's tests were performed. (See date stamps, CX 31, R. VI, 896.) The point is not that Dr. Johnson failed to follow an instruction. It is simply that, quite apart from the fact that his experiment could not possibly have any relevance as to whether the Evis unit prevented or removed scale in the proper operation of steam condensers, it was irrelevant because the water used had a silica content far in excess of the content which petitioners had specifically represented was the upper effective limit for Evis treatment.

Another example of a complete failure to understand the testimony is the Commission's comment with respect to Merrell's ion exchange test. The Commission says (Resp. Br. 49-50):

"They criticize the base-exchange-softener test because the experiment took only three hours. Yet, petitioners have advertised that the results of the Evis will be apparent 'immediately upon installation' (CX 18-VI, 853; CX 33-VI, 902). Indeed, two of petitioners' consumer witnesses stated that they noticed the results of Evis action *immediately* upon use (III, 2047-2048; IV, 2256)."

In our opening brief we described the discovery and operation of the ion-exchange softener (pp. 55-56). The point of our criticism (Pet.Op.Br. 32-33), and that of the Hearing Examiner (R. I, 724, quoted at p. 33 of Pet.Op.Br.), is not that the Evis unit does not have an immediate effect upon water, but that a three-hour experiment in a laboratory, with 16 quarts of water and two ounces of ion-exchange material, has no relevance to actual operations in water systems where the normal cycle is two to four weeks. And this is particularly true, as noted by the Hearing Examiner (R. I, 724), because petitioner Wells' testimony was specific that the Evis unit will not improve the action of a clean base exchange water softener but does, throughout the life of normal operations, act to reduce the deposit of impurities upon the granules of the water softener, thus keeping more surface area exposed.

B. The Evis "pipe" (Resp.Br. 5).

In its opening statement of "The facts," the Commission says (pp. 5-6):

"The Evis * * * is just a piece of pipe having the appearance of an oversized coupling with a vertical crosspost cast inside * * * made of cast iron or bronze * * * Petitioner Wells * * * testified that he had invented the piece of pipe called 'Evis' * * *."

Thereafter throughout its brief the Commission refers to the Evis water conditioner as a "piece of pipe."

These deprecatory statements have not heretofore appeared in any brief filed by counsel supporting the complaint. We simply point out that the Hearing Examiner held (R. I, 701):

“It should here be observed that the Evis Water Conditioner has been shown to be composed, not merely of ordinary cast-iron, but in one case of a specially processed cast-iron containing unidentified elements and produced by a special process and in the other case of a specially processed bronze of which no qualitative analysis was made.”

and that the Commission sustained this finding (R. I, 814):

“In our opinion, counsel supporting the complaint has failed to prove that the Evis device is not made of a specially processed metal.”

C. The purported conflict in the consumer testimony.

Characteristic again of the Commission's misrepresentation of the record are its repeated statements that the record contains “conflicting user testimony” (Resp.Br. 32) and that petitioners' entire case boils down to a statement by 91 users that “they were satisfied with the unit”, whereas 3,000 other dissatisfied users would “flatly contradict” (Resp.Br. 54) or “offset” (Resp.Br. 10) the testimony of the 91. The Commission says:

“Petitioners' entire rebuttal evidence consisted of what is generally known as consumer or user testimony, given by 91 witnesses. On the other hand, the record also demonstrates that 3,000 other users, had they been called to the stand, would have testified that Evis was a failure, so that the statements of petitioners' witnesses would have been more than offset (Resp.Br. 10).⁴

⁴For similar statements, see Resp. Br., 24, 25, 27, 31, 32, 54.

In our opening brief we answered a passage from the Commission's decision similar to the foregoing statements (pp. 78-80). That these statements should now be repeated in the Commission's brief is, to say the least, surprising.

The record in this case is quite clear that approximately 100,000 units were sold, of which approximately three per cent failed to work for various reasons.⁵ These reasons included the nature of the particular water, electrical disturbances (R. IV, 2922, 2926), defects in the piping system,⁶ etc. The record is also quite clear that the exact representation made by Evis in this regard is (CX 31; R. VI, 900):

“The current national average of EVIS installations is about 97% successful.”

To aid in appraising the above-quoted representations of the Commission we add to the quotations in our opening brief (pp. 79-80) a few more excerpts from the record. In the argument and colloquy on the Commission's proposal

⁵Tudury testified that of some 18,000 to 22,000 units he had sold and installed there were “way less than five per cent” which he was unable to make function properly (Tr. IV, 2916, 2921). Herwig testified to 15,000 units sold, with failures of less than 4 per cent (Tr. IV, 3145). Moran testified to 100 per cent success on ships, where you can't “find a better [electrical] ground than steel to salt water” (R. IV, 2469, 2989).

⁶“* * * for example, taking a simple installation, and the man would get Evis treated water over in this section of his house and he wouldn't get it over here. So they began tracing these lines back and they'd find a corroded union, perhaps one of these what we call a railroad union, which is half bronze and half galvanized iron and it might get a little corroded and galvanic action would set in and that galvanic action would kill the Evis action. So by taking a piece of wire and shunting around that union the action was—the galvanic action was killed and the Evis water would go right on through and come out at the tap, treated” (R. IV, 2924).

to reopen its case and to begin all over again,⁷ counsel for petitioners pointed out (R. V, 3751-3752) :

“Our own witnesses which we called in our case, the respondents’ witnesses have frankly conceded that it does not work in every case. The testimony of our distributors has shown that something in the order of 3 percent of the instances where the particular water, the type of installation, the particular electrolysis problem, the grounding problem is such that there has not been success.

Taking that record, then as it now exists, a fair conclusion would be that there must be some 3,000 units throughout the United States that have not worked satisfactorily out of a hundred thousand.

Now we have not disputed that fact in the record to date. We have come out and supported that conclusion with our own witnesses.

We don’t feel that that is critical to that case. We feel that a product of this type which has a 97 percent success average, with a hundred thousand units throughout the country, demonstrates the merit of the product.

We feel that 3 percent is nothing more or less than what you would find for a national average on almost

⁷The Commission did not offer in rebuttal, as properly it could, to show that the installations which petitioners had proved to be successful were not in fact successful. It asked to start all over again on its case in chief and to introduce evidence concerning numerous other installations. This would not only have opened the door to proof by petitioners concerning the cause for failure of each such unit, such as improper installation, defective piping, nature of the water, etc., but also, if proper limits on rebuttal testimony were continued to be relaxed, to “rebuttal” testimony of successful use by 97,000 other users. For a quasi-judicial body to have permitted such a perversion of accepted trial procedures would have turned this administrative hearing into an instrument of oppression impossible for an ordinary citizen to combat (See Pet. Op. Br. 78-80).

any product. What does counsel supporting the complaint propose to do? Is he going to add anything to the record that is not already there?"

Counsel supporting the complaint in part responded (R. V, 3756):

"They said that the only real way to judge the effects of their product was in field or practical installations and they therefore produced, proceeded to introduce testimony that it is effective in field or practical operations as opposed to the lab tests which my witnesses had testified to.

Therefore I feel that it is perfectly proper rebuttal to show that in field and practical tests, it does not *always* [italics added] work, and that this issue has been raised by the respondents on their defense."

After further colloquy counsel for petitioners stated (R. V, 3760):

"We take the position that they are 97 per cent successful. By the same token we are willing to concede that there have been 3 percent unsuccessful."

Thereafter the colloquy quoted in our opening brief occurred. The admission of counsel that 3,000 installations were unsuccessful was made with the express "reservation" that petitioners claim and could show 97,000 successful units (R. V, 3765):

"HEARING EXAMINER LIPSCOMB: One part of your statement is an admission, the other is a self-serving declaration and they would be so regarded.

MR. MICHAEL: I don't quarrel with that. I am only making the admission *with that reservation* [italics added]. I am saying that that is what the

record shows. The record shows a hundred thousand sold and we only claim 97,000 units successful. We concede 3,000 that are unsuccessful. I am not going to quarrel and I don't think the decision in this case hinges on whether it is 3 percent or 5 percent or 10 percent or 15 percent.

HEARING EXAMINER LIPSCOMB: It doesn't."

Counsel for petitioners did not ask the Commission to accept or stipulate as to the 97,000 successful uses, but did make the concession as to unsuccessful uses with this express reservation. For the Commission now to attempt to torture this admission into a representation that the record shows 3,000 unsuccessful uses as against 91 successful uses, thus "offsetting" (Resp.Br. 10) and "overwhelming" (Resp.Br. 31) the testimony of petitioners' witnesses is, we submit, unjustified and inexcusable.

D. Drs. Albrook and Adams (Resp.Br. 48-49).

The Commission seeks to rehabilitate Drs. Albrook and Adams (Resp.Br. 48-49):

"* * * petitioners reject as implausible the explanation of the dissimilarity of scaling on the coffee urns equipped with the Evis pipe as compared to the scaling of urns without the device (Br. 40-41). Quite the contrary is true. Drs. Albrook and Adams testified that at least twice as much, if not three to four times as much, water ran through the coffee urns without the Evis as through those with the Evis pipe, thus accounting for the differences in scaling (II, 596, 597, 770-771, 851, 880-881."

This is but a part of the confused and unsatisfactory testimony these witnesses gave as to why in their test

the untreated coffee urn was so badly scaled (fig. 3, CX 39, R. VI, 916) as compared to the two urns supplied with Evis treated water (id., figs. 1 and 4). Dr. Albrook sought to explain the comparative freedom from scale of the Evis-treated urn in figure 4 by saying that it

“* * * had not had sufficient [water] through it as yet [as compared to the untreated urn in figure 3] to be able to build enough scale on the coils [so] that it would crack off” (R. II, 597).

But at the same time the record showed that the Evis-treated urn in figure 1, with even less scale than that in figure 4, had used the same amount of water as Dr. Albrook complained of in the badly scaled untreated urn shown in figure 3.⁸ Further, when Dr. Adams was questioned as to why the Evis-treated water in the urn in figure 4 was softer than untreated water, his explanation completely discredited Dr. Albrook's explanation (R. II, 881-882):

“Q. I understand you. In other words, since they don't run as much water through it, and don't draw off as much coffee as the other urns, the non-Evis urn, you have a volume of water sitting in the urn for a longer period of time?

A. That is correct.

Q. With the coils heated?

A. That is correct.

Q. And under those circumstances, you would normally expect to find a greater precipitation of the

⁸Dr. Albrook testified that 775 cubic feet of water was used in the urn in figure 3 and that 35 gallons of water per day was used in the urn in figure 1 (for 5½ months) (R. II, 763, 770). Thirty-five gallons is 4.7 cubic feet; 5½ 30-day months is 165 days; 165 times 4.7 cubic feet equals 776 cubic feet.

calcium and magnesium from the water, is that correct?

A. That is correct.

Q. And that explains why the water in that urn, after it passes through the urn, had a lower hardness than the water that went through the non-Evis urn?

A. That is exactly correct.’’

In short, according to Dr. Adams’ explanation, far more scale should have been found on the walls of the Evis equipped urn because of the greater precipitation of calcium and magnesium from the water; yet, as the photograph shows, that urn was cleaner than the non-Evis urn.

To lay at rest once and for all the testimony of these two witnesses, we quote the Hearing Examiner who observed and heard them (R. I, 718-719):

‘‘Both Dr. Albrook and Dr. Adams undertook the tests here in evidence with the preconception that the Evis Water Conditioner was worthless. Furthermore, at a conference held in August, 1952, which was attended by a representative of the Respondents herein, and by Dr. Adams and Dr. Pearl, Director of the Institute of Technology at Washington State College, a question arose as to Dr. Adams’ personal bias in the matter of conducting tests with the Evis Water Conditioner. At that time Dr. Pearl stated that Dr. Adams would be relieved from any further investigation of that device. Despite this statement, Dr. Adams did subsequently participate in the various tests, the results of which are now under consideration.

* * *

The testimony of these witnesses regarding their prejudgment of the value of the Evis Water Conditioner is so evasive that we are constrained to con-

clude that such a preconception did exist in the minds of both Dr. Albrook and Dr. Adams. * * *

In support of their tests, several photographs purporting to show the effect of the Evis Water Conditioner on hot water tanks and coffee urns were presented. The contrasting pictures in these exhibits tend to indicate that less scale had been deposited on the appliance in which Evis-treated water was used. Both witnesses offered several reasons, other than the effect of the water, why there was less scale in the appliances using Evis-treated water and more in the others. The overall impression received from the testimony of these witnesses as a whole, however, is that the factual content thereof is too much intermingled and clouded with evasions, qualifications and attempted explanations to constitute reliable, substantial and probative evidence that the Evis Water Conditioner will not prevent or remove scale in a water system.”

E. Dr. Weast's tests (Resp.Br. 44).

At page 44 of its brief the Commission characterizes as “ridiculous and frivolous” our statement that petitioners have never claimed that the Evis unit will “remove the Cleveland type of scale” (referring to pages 39-40 of our brief). This is not what we said. We said that petitioners have not represented that the Evis unit will remove “encrustations resulting from the corrosion of metals” (Pet.Op.Br. 39-40). Our statement is correct. The Commission characterizes it as “ridiculous and frivolous” because the Evis bulletins represented that the unit “combats or eliminates corrosion” (Resp.Br. 44). Reference to the bulletins cited by respondent (Resp.Br. 44) will show that the Evis representation is not that the unit will re-

move the encrustations of old corrosion, but that it will prevent corrosion by releasing from the water entrained gases which cause the pitting of metal.⁹ We submit that if a manufacturer represents that a product will *prevent* corrosion by releasing entrained gases which cause the pitting of metals, and it is charged that this representation is false, it is not "ridiculous and frivolous" to assert that it is irrelevant to attempt to show that the product will not *remove* heavy encrustations resulting from seven years of corrosion (R. III, 986, 1069).

F. Dr. Hoffman (Resp.Br. 12-13).

The Commission seeks to discredit Wells' testimony concerning catalytic effect by relying on Dr. Hoffman's statement "that Wells' claim of the catalytic effect's changing 'something physical' was scientifically untenable (III, 1118). * * * a catalyst cannot cause a reaction to occur; it can merely accelerate an existing reaction * * *" (Resp.Br. 13).

The following is from Dr. Hoffman's cross-examination (R. III, 1330-1333):

⁹One of many examples in the record is the case of the Dallas City Packing Company, a large meat packing plant in Dallas, Texas (R. V, 3612-3613), which had experienced a severe pitting problem in its pipes, boilers, cookers and ice-making machinery due to the high carbon dioxide content in the water from the company's well (R. V, 3613-3617). "Little clinkers would form on the inside of the pipes and when these would slough off, it would leave a pit in the metal, and eventually would come on through the outside and cause leaks" (R. V, 3614). Mr. Waldman, a graduate engineer and a partner in the firm, testified that the Evis unit "has reduced our corrosion problem to what I would call a minimum" (R. V, 3619). He stated that in the past it had been necessary to replace steam lines and valves every three to six months; after the installation the lines remained in service a year and a half to two years (R. V, 3620).

“Q * * * There is, is there not, Doctor, a body of scientific opinion which holds to the belief that a catalyst can initiate a reaction as distinguished from merely affecting the rate of the reaction?

A I presume that is true. I am not familiar with it.

* * * * *

Q I will read the statement to you again, Doctor. It is as follows:

‘The ability of a catalyst to initiate a chemical reaction is as yet unsettled in the minds of most authorities.’

I will ask you, Doctor, whether you agree or disagree with that statement.

A I can’t answer it.

* * * * *

A * * * Understand, I am not an expert in catalysis. It is a terrifically big field.”

Again, in connection with Dr. Hoffman’s admission that his test for surface tension should be “summarily discarded as valueless” because it did not comply with Dr. Dorsey’s requirements, the Commission says that petitioners attributed to Dr. Hoffman a statement he never made (Resp.Br. 44). The record is as follows (R. III, 1359-1362):

After Dr. Dorsey was identified as a former member of the Bureau of Standards, the following was read from Dr. Dorsey’s book:

“Q * * * Each determination must be studied individually and in every detail, including the derivations of the formula and their applicability to the experimental conditions actually realized. This involves great labor. In general every determination

based upon observations and computations that have been published without sufficient detail to enable one to make such a critical study should be summarily discarded as valueless.'

Do you agree with that?

A That is all right.

* * * * *

Q * * * In your opinion does your record of the tension tests that you conducted on Evis meet the requirements or meet the standards of Dr. Dorsey as expressed in this book of his that was written while he was a member of the National Bureau of Standards?

A It does not meet those standards."

Dr. Hoffman then sought to qualify his answer by stating that he could ignore some of the factors specified by Dr. Dorsey. Cross-examination then took him through numerous requirements specified in Dr. Dorsey's book, and in each case Dr. Hoffman said that he either had not complied with the requirement or had made no record (R. III, 1363-1369). In each case he stated that he agreed with Dr. Dorsey.

Dr. Hoffman's admission that in any event the surface tension test was not a conclusive test as to "the effect of Evis" on water (R. III, 1369) is quoted in our opening brief (pp. 34-35).

Finally the Commission quotes Dr. Hoffman's volunteered statement concerning the Evis unit installed in the Government's Old Dominion Building at Arlington: " * * * the sealing problem was not solved by the use of the Evis water conditioner. It was simply a case of half a dozen places some scale had broken off and had

fallen to the bottom, so that what I saw there would be very inconclusive, no matter how I saw it or under what circumstances” (Resp.Br. 47).

It was immediately following this statement that the following occurred (R. III, 1342-1343):

“Q I see. The fact that the unit was de-scaling there and you saw evidence of that in your opinion carried no weight one way or the other, Doctor, is that it?

A I have to base that—I hope you understand—on the fact that I did not see another one close by under the same circumstances which did not have an Evis conditioner on it.

Q All right.

A I must hold to that.”

Dr. Hoffman *did* see two evaporative condensers “close by under the same circumstances” at the Department of Agriculture Station at Beltsville, Maryland, one equipped and the other not equipped with an Evis conditioner. He “observed * * * that the Evis unit was clean as compared with the non-Evis unit which was scaled.” He overheard “personnel at the station [say] that in the case of the Evis unit they had at that time been able to operate it for eight weeks without cleaning as distinguished from their prior practice of cleaning it every 10 days to 2 weeks” (Pet.Op.Br. 28-29). He disregarded these two installations “close by under the same circumstances” because he was “a little reluctant to go into the installations in another department, * * *” (Resp.Br. 46).

G. Petitioners' witnesses O'Connell and Frantz (Resp.Br. 10, 25-26, 39-40).

The Commission criticizes petitioners because their expert witness O'Connell was not asked to express an opinion as to the scientific laws "which explain the functioning of the Evis pipe, and above all whether the Evis pipe has any effect on water" (Resp.Br. 40). Instead, it says, he "observed sepulchral silence in this respect" (Resp. Br. 40, 26).

Mr. O'Connell has "never done any work of any nature for the Evis Company" and was retained by counsel for petitioners to aid them in the trial of this case (R. IV, 3044). He was called as an outstanding expert in the field of water treatment to comment on the Commission's so-called tests and to give, for a better understanding of the issues, expert testimony in the broad field of water treatment. His testimony is summarized in part at pages 47-56 of our opening brief. It is impressive and helpful.

The Commission knows that petitioners made no attempt to show *why* the Evis unit works. The inventor himself does not know. He knows that it works. He knows that the results occur because of the special processing of the metal. He knows how to process the metal to get those results, a process discovered through experimentation, and he has applied for a patent on that process.

The Commission's position, that actual performance must be discredited if it cannot be explained, is without support in the law. In the leading case of *Diamond Rubber Co. v. Consol. Tire Co.* (1911) 220 U.S. 428, the Supreme Court held (pp. 435-436):

“A patentee may be baldly empirical, seeing nothing beyond his experiments and the result; yet if he has added a new and valuable article to the world’s utilities he is entitled to the rank and protection of an inventor. And how can it take from his merit that he may not know all of the forces which he has brought into operation? It is certainly not necessary that he understand or be able to state the scientific principles underlying his invention, and it is immaterial whether he can stand a successful examination as to the speculative ideas involved.”

Similarly, in *DeForest Radio Co. v. Gen. Elec. Co.* (1931) 283 U.S. 664, 686, the Supreme Court said:

“Whether [the inventor] knew the scientific explanation of it is unimportant, since he did know and use the device and employ the methods, which produced the desired results.”

Turning to petitioners’ witness Frantz, the Commission says that the testimony of the Commission’s experts “was corroborated by that of the only scientist, a chemist, who was called as a witness on behalf of petitioners and who stated on the stand that tests to substantiate the validity of the Evis claims had proved to be inconclusive” (Resp. Br. 10, and see 25, 26, 39).

Again, let the record speak. Mr. Frantz’s statements, quoted out of context by the Commission (Resp.Br. 25), are: “Frankly, I haven’t seen enough evidence to state as a scientist that I have seen there is proof that the Evis unit does do it * * * (IV, 2803)”, and “As a scientist, I can’t say for sure.” These statements, we submit, only make more impressive the testimony of this scientist who,

after conducting carefully controlled tests with the Evis unit which consistently showed beneficial results, testified (R. IV, 2806, 2803) :

“* * * I think there’s been about eight experiments that we did with varying compositions and found this consistent result. I am not prepared to say my mind is made up that the Evis was the cause of it. I made these tests, I found these results, and they do indicate that possibility.”

“I don’t care to express a firm opinion. I do wish to state very definitely that I have seen certain evidence that there is an Evis effect and I haven’t been able to explain the observed data in any other way.”

H. Petitioners’ instructions (Resp.Br. 32-39).

Once again the Commission seeks to meet the criticism of the Hearing Examiner (Pet.Op.Br. 45) for the failure of its experts to follow petitioners’ instructions (Pet.Op. Br. 45). Again the Commission reviews the instructions issued by petitioners, and complains of differences in them. It points out that petitioners’ last instruction, issued near the close of these proceedings, eliminated entirely any description of grounding procedures (Resp.Br. 32-36).¹⁰

¹⁰This point can be quickly disposed of. Prominent on the face of this last bulletin, printed with the Evis guarantee, is the statement (CX 57; R. VI, 954) :

“After installation service—inspection must be made by the same dealer issuing the Guarantee Certificate.”

The testimony in this case is abundantly clear that the service representatives of Evis, in inspecting the installations, made certain before final approval that they were properly installed. In this regard particular attention was paid to grounding (see, for example, R. IV, 2928).

Further, says the Commission, its experts should not be held to a strict compliance with petitioners' instructions because many installations of petitioners' own witnesses were not made pursuant to the instructions (Resp.Br. 36). Finally, the Commission says, those of its experts who performed their tests before certain instructions were issued cannot be criticized for not following those instructions.

Our opening brief points out that numerous installations from the outset worked without grounding; that changes in the instructions were made from time to time as field experience disclosed that electrical currents were causing certain failures and as other experiences dictated change (Pet.Op.Br. 42-44, 74-78). The trial of this case commenced in 1954. All the instructions necessary for the proper installation and operation of petitioners' product had been issued and were in the Commission's hands long prior to the trial and even long prior to the filing of the complaint (CX 8, 27; R. VI, 832, 885; RX 34; R. VI, 1010). With full knowledge of these instructions the Commission sought to rely upon the opinions of so-called experts based upon outdated experiments performed in accordance with outdated instructions. Of course, as the Commission says, "Scientists could not possibly have known about [the instructions] before the date of [their] publication" (Resp. Br. 39). But this misses the point entirely. When the Commission offered the opinions based upon these experiments it knew that the experiments had been performed upon defective installations. And this is the more inexcusable, because the instructions which had been issued prior to trial had been published after practical experi-

ence had demonstrated that installations which failed to comply with them could be ineffective. As the Hearing Examiner held (R. I, 710):

“It seems essential, however, that if a device is to be tested, the manufacturer’s directions for the use thereof should be faithfully followed. It seems both unfair to the manufacturer and logically unsound to expect reliable results from an experiment conducted in disregard of the manufacturer’s instructions for the proper use of the product being tested.”

I. The Commission’s suggestion that the discontinuance of chemicals or changes in water supply “could have caused” the benefits which resulted from the installation of the Evis units.

At pages 38-39 of its brief the Commission says, “With regard to most user installations the consumers’ testimony was confined to ‘before and after’ results, thus making a concurrent comparison between Evis-treated and non-treated water impossible.” In these circumstances, the Commission speculates, “any one of a number of factors unrelated to the Evis pipe *could* have caused” the beneficial changes the witnesses experienced. For example, the Commission says, “in many cases numerous witnesses discontinued the use of * * * chemicals” and, therefore, “it is a matter of pure speculation whether the Evis pipe or the discontinuance of * * * chemicals caused a change in conditions.” Further, says the Commission, some witnesses “testified about changes in the water supply” and “Others did not know whether there was a change in the water supply.” These factors, says the Commission, “may well have contributed to a change in the water regardless of the installation of the Evis pipe.”

It is true, of course, that most of petitioners' witnesses described conditions existing before and after the installation of Evis units. This necessarily was so where the unit serviced the only equipment or the whole plant. At the same time, the Commission fails to point out that the record contains the strongest kind of evidence of carefully controlled parallel tests made by experienced engineers on identical equipment. In each case these tests exhibited marked differences and showed exceptional performance by the Evis. In the Appendix to this brief we summarize the testimony concerning parallel tests conducted in the Post Office and Court House Building in Fresno (where hearings in this case were held), in the Fresno plant of the Central Valley Ice Company, in the Fresno Bee Building, in the G. W. Hume Company canery at Turlock, and in the Bridgford Packing Company plant at Anaheim.

Beyond this, the Commission's speculations are directly contrary to the record. As to chemicals, witness after witness testified that one of the very benefits flowing from the installation of Evis units was the fact that expensive chemical treatment could be discontinued. Elsewhere in its brief the Commission takes the position that chemical treatment of water is the only treatment that can be effective. Here it seems to contend that the beneficial results which flowed from the Evis conditions should be attributed to the *discontinuance* of chemical treatment.¹¹

¹¹The argument, of course, is absurd. In support of it the Commission, in footnote 19 on page 38 of its brief, gives record citations to the testimony of a number of witnesses. Typical is that of

The Commission's other speculations about "changes in the water supply" of certain witnesses and about the lack of knowledge by other witnesses as to whether there had been any "change in the water supply" (Resp.Br. 38) are equally without merit. They rest on random cross-examination never connected up in any way with the "before and

Witness Rogers, Plant Foreman of the Nehi Bottling Company plant at Orange, California (R. III, 2132, 2133-2134):

Q And with this chemical water softener in operation, did you have any scaling problems in the equipment, the soaker, or any of the washing or bottling equipment?

A Yes, we did with the water softener. We had scale. Seale built up every once in a while. We would have to—well, I would say probably once a week, we would have to take out the jets and clean them off because they would become stopped up from scale.

* * * * *

Q Now, you say that you installed the Evis approximately three-and-a-half years ago?

A Yes.

Q Since that time, what, if any, changes have you noted in the condition of the scale on the equipment?

A The scale has, well, our machine today has no build-up at all on the chain itself. There is still some in the corners, of the previous scale, but it is soft. It has become soft, so it is easy to remove.

Q I see. Have you continued to use the chemical water softener since the installation of the Evis?

A No, I have taken out the water softener altogether. We just use the Evis.

Q While the water softener was being used, before the installation of the Evis, did you find or experience any problems with the change in the cycle of the softener?

A Well, yes, you had to watch it quite closely because if you run out, then your scale build-up was as bad as when you first started. The alkalinity in the Orange water is approximately 183 parts per million which is pretty high.

Q And since the installation of the Evis and the elimination of the water softener, have you also been able to eliminate that problem?

A Yes, I have. I don't have to watch it at all now. All I have to do is turn the water on and just go to work."

after” results,¹² or on descriptions of water having nothing to do with the validity of those results.¹³

It is solely upon the basis of these completely untenable speculations that the Commission asserts (Resp.Br. 30):

“Small wonder, in the light of such a state of the record, that the Commission could attach little value to the user testimony.”

¹²For example, as to “changes in the water supply,” the Commission cites the witness Perata, who testified (R. IV, 2384):

“Q Do you know where the Oakland city water comes from?

A Well, we have various reservoirs over there. We have them in San Leandro, we have them in the Berkeley Hills and we have them in Contra Costa County and in various locations.

Q And they draw from different reservoirs at different times, do they not?

A That’s right.

MR. DOWNS: I believe that is all.”

As to lack of knowledge of “change in the water supply,” the Commission cites the witness Manney, who testified (R. IV, 2695-2696):

“Q Do you know what the source of the water is that you used to make this test.

A Yes. It’s Vallejo city water. We buy our water from the City of Vallejo.

Q Do you know whether or not that is well water or reservoir water or lake water?

A I think it’s reservoir. I’m not sure.

Q Do you know whether or not the city puts it through any sort of treatment?

A No. I couldn’t answer that because our—I know that our source is two 21 inch lines that run from the City of Vallejo.”

¹³For example, the Commission cites the witness Bowen, President of S. R. Bowen Company, manufacturers of oil well equipment in Santa Fe Springs, California. This witness testified (R. III, 2061):

“Q Now, at the present time, is your water supplied to you by the city water system in Santa Fe?

A It is.

Q Has that been a recent change in the supply?

A Very recent.

Q Within the last several months?

A Yes.

Q Prior to that, what was the supply of your water?

CONCLUSION

We submit that the order of the Commission is unwise, unjust and unsupported by substantial evidence. We repeat the words of the Hearing Examiner in his Second Initial Decision (R. I, 731-732):

“* * * we may be here confronted with the first practical application of a device operating upon a principle heretofore unrecognized by present-day science. In the presence of such a possibility, justice to the Respondents as well as to the public interest requires that we approach with caution the issuance of a cease-and-desist order which might well mean the economic destruction of the Respondents and the consequent loss of their device.”

And we refer again to the words with which the Hearing Examiner closed his First Initial Decision (R. I, 547):

“It is the purpose of the Federal Trade Commission, and of Congress in enacting its empowering statutes, to remove hindrances and obstructions in the course of commerce, and to direct and facilitate its flow—never to set up roadblocks in its way. We cannot, in this instance, justify the issuance of an order

A Our own well on the property.

Q And can you tell us whether that, directing your attention to the well water, can you tell us whether that was a hard water or soft water or what?

A It was extremely hard water that we could not drink.

Q It was used, however, in the water piping system throughout the plant?

A It was.”

But the Evis conditioner concerning which Mr. Bowen testified had been in operation more than two years (R. III, 2062), and his testimony related entirely to experience with the hard well water. The “recent change” had nothing to do with “before and after” performance.

which might act as a brake on the wheels of progress.’¹⁴

We respectfully submit that the order of the Commission should be set aside.

Dated: San Francisco, California,
June 30, 1960.

Respectfully submitted,

FRANCIS R. KIRKHAM,

JAMES MICHAEL,

HARRY C. SCOTT,

PILLSBURY, MADISON & SUTRO,

Attorneys for Petitioners.

¹⁴Compare *De Forest's Training v. Federal Trade Commission* (7 Cir. 1943) 134 F.2d 819, where in 1943 the court affirmed a cease and desist order issued by the Commission against a school for television mechanics, saying (p. 821):

“No one can say with certainty when the commercial development of television will reach a stage which assures opportunities for employment of large numbers of men.”

Appendix.

Appendix

INSTANCES OF PARALLEL TESTS OF THE EVIS UNIT.

1. The Post Office and Court House Building, Fresno, California.

This building is equipped with three independent and identical air-conditioning systems, each of which contains two air washers used as cooling towers together with its own bank of extended surface cooling coils. Raymond A. Crosby, superintending engineer for the United States Post Office Department, testified that since the opening of the building in 1940 he had always been faced with a critical problem caused by the formation of flint-like scale in the closed copper tubing of the extended surface cooling coils (R. IV, 2328). After each season, considerable expense and many man-hours were required to remove the scale by separately drilling each copper tube. Mr. Crosby installed an Evis unit on one of the three systems. At the end of the next season he examined all three systems and discovered that the tubing in the system equipped with Evis contained only a soft fluffy material which could easily be washed out, whereas the other two systems had continued to scale as they had in the past (R. IV, 2331-2332, 2338, 2683).

Subsequently, additional Evis units were purchased and installed for the other two air-conditioning systems and at the end of the following season Mr. Crosby found that these two systems had been benefited in the same way as had the first. This test was performed under the supervision of Carl L. Shepard, Chief of the Construction and Supervision Branch of the General Services Administration of the United States (R. IV, 2680-2683), part of whose testimony is quoted in petitioners' opening brief, pages

10-11. Mr. Shepard also testified to successful results with at least seven additional Evis units in installations on other Government buildings (R. IV, 2680-2686).

2. Central Valley Ice Company plant, Fresno, California.

Central Valley Ice Company operates 14 plants in the San Joaquin Valley, California. At its Fresno plant it operates three evaporative condensers, two identical ones of 60-ton capacity and one of 75-ton capacity. Prior to the installation of Evis the 75-ton unit had been regularly treated with chemicals (R. IV, 2276). No treatment had been given the two 60-ton units and they had become so badly scaled that the head pressure had increased to 180 pounds as compared with a normal pressure of 120 to 125 pounds (R. IV, 2270). For every 10 pounds of increase in head pressure, electric power consumption increased 2 per cent. Fernon C. Wickstrom, refrigerating engineer for the company, testified that at a cost of approximately \$800 he had the two 60-ton units cleaned with acid, which was successful in removing only approximately 75 per cent of the scale (R. IV, 2274). He then installed an Evis unit on one of the 60-ton units for a trial period; the other two units he treated with chemicals. After careful observation throughout the following year he found that the Evis-equipped condenser provided the same results as were accomplished on the other two with chemical treatment. Evis units were then installed on the other two condensers and chemical treatment discontinued, after which the Evis units removed about half of the old scale remaining after the \$800 descaling (R. IV, 2278). At the time of the hearing Mr. Wickstrom testified that all three condensers had remained clean and in excellent operating condition.

3. Fresno Bee Building, Fresno, California.

Arthur M. Lucas, Building Superintendent of the Fresno Bee Building, installed an Evis on a 40-ton evaporative condenser with which he had experienced a serious scaling problem and which was heavily scaled at the time of installation. Paralleling this unit he had a new 65-ton condenser which he operated without an Evis. At the end of the season the 40-ton condenser equipped with Evis had descaled, while the new 65-ton condenser had accumulated a hard scale (R. IV, 2313-2314). Thereupon, the installation of the Evis was changed so that it would serve both condensers, after which the scale disappeared from the 65-ton condenser and both units remained clean, eliminating the need for constant cleaning and descaling which had formerly been necessary (R. IV, 2315).

4. G. W. Hume Company plant, Turlock, California.

The G. W. Hume Company cannery uses four large boilers in its operation. Arthur A. Gallardo, superintendent of the plant, testified to a long history of severe scaling in all four boilers despite the use of boiler compounds at a cost of approximately \$1500 per year (R. III, 2165-2167). An Evis unit was installed on one of the four boilers on a trial basis and operated for an entire canning season. At the end of the season there had been no scale formation in the Evis-equipped boiler and a substantial amount of the old scale had come loose. Scaling continued in the other three boilers. Three additional Evis units were purchased and installed on the remaining boilers after which there was no build-up of scale in any of the boilers (R. III, 2166).

5. Bridgford Packing Company, Anaheim, California.

Lawrence L. Sligh, Chief Engineer for the Bridgford Packing Company, testified to the operation of two 100-horsepower boilers. He had experienced a severe problem with heavy build-up of rock-like scale, although attempting to control the scale with boiler compounds at a cost of between \$600 and \$800 per year (R. III, 1896-1898). When the company bought an Evis unit, Mr. Sligh installed it on the make-up line to one boiler only and thereafter operated one equipped with an Evis and the other not equipped (R. III, 1896-1898). After finding that the Evis-equipped boiler was descaling while the other continued to build up scale, he changed the installation so that the Evis would serve both boilers. Old scale was eliminated in both and no new scale formed, and Mr. Sligh found that he could reduce the water pressure from 100 pounds to 60 pounds to satisfy his requirements (R. III, 1895-1896), and that operating temperatures could satisfactorily be reduced from 1600-1800°F to 800-1200°F at substantial savings in fuel costs (R. III, 1897-1901, 1910). He used boiler compounds for a while as a precautionary measure, but found that their use was not required. "When the supply of chemical compound ran out, why, I didn't buy any more. Q. And since that time you have been able to operate the boilers without any compound? A. That's right" (R. III, 1896).